

WHAT IS CLAIMED IS:

1. A continuous circular motion filling machine for filling containers conveyed thereto, said machine comprising:
 - a conveyor configured to carry and convey containers to be filled;
 - a rotating platform having an in-feed section disposed to receive
 - 5 containers from said conveyor and an out-feed section disposed to transfer filled containers from said rotating platform, said rotating platform rotatable relative to a vertical rotating axis;
 - a filling turret disposed generally above said rotating platform and rotatable relative to said vertical rotating axis at a speed corresponding generally
 - 10 to that of said rotating platform, said filling turret further comprising a plurality of filling heads movable from a rest position to a filling position as said turret rotates between said in-feed and out-feed sections;
 - each said filling head comprising a plurality of filling elements, said filling elements moving into engagement with the containers as said filling heads move
 - 15 to said filling position for filling the containers;
 - a plurality of radially extensible and retractable indexing arms circumferentially spaced around said rotating platform, said indexing arms retracted at said in-feed section and subsequently extended as said rotating platform rotates so as to index the containers into groups on said rotating
 - 20 platform between said indexing arms, each said group associated with a respective said filling head and arranged in a pattern corresponding to the pattern of said filling elements of said respective filling head.

2. The filling machine as in claim 1, further comprising in-feed guide elements disposed generally at said in-feed section so as to guide the containers from said conveyor onto said rotating platform in a desired pattern.
3. The filling machine as in claim 2, wherein said in-feed guide elements are disposed so as to convey the containers onto said rotating platform in a single serial row.
4. The filling machine as in claim 2, wherein said in-feed guide elements are disposed so as to convey the containers onto said rotating platform in multiple parallel rows.
5. The filling machine as in claim 2, wherein said in-feed guide elements extend around at least a portion of the circumference of said rotating platform, said filling heads movable from said rest position to said filling position before the containers are moved beyond said in-feed guide elements.
6. The filling machine as in claim 2, further comprising exit guide elements disposed generally at said out-feed section of said rotating platform.
7. The filling machine as in claim 6, wherein said filling heads are movable from said filling position to said rest position after the containers are moved into said exit guide elements.
8. The filling machine as in claim 1, further comprising in-feed guide elements disposed generally at said in-feed section so as to guide the containers from said conveyor onto said rotating platform in a desired pattern, and exit guide elements disposed generally at said exit section of said rotating platform, said
5 filling heads movable from said rest position to said filling position before the

containers are moved beyond said in-feed guide elements and movable from said filling position to said rest position after the containers are moved into said exit guide elements.

9. The filling machine as in claim 1, wherein said indexing arms are cam actuated between their extended and retracted positions as said rotating platform rotates about said vertical axis.

10. The filling machine as in claim 1, wherein said filling heads are vertically movable between said rest and filling positions as said filling heads rotate with said filling turret.

11. The filling machine as in claim 10, wherein said filling heads are movably supported on generally vertically oriented support arms disposed circumferentially around said filling turret, said filling heads driven in a reciprocating vertical path on said support arms.

12. The filling machine as in claim 11, wherein said filling heads are engaged with a cam track as said filling turret rotates, said cam track driving said filling head in said vertical path on said support arms.

13. The filling machine as in claim 1, further comprising a reservoir disposed generally atop said rotating turret, said filling heads comprising accumulator tanks supplied with a filling liquid from said reservoir.

14. The filling machine as in claim 13, wherein said filling elements associated with each said filling head are in fluid communication with said accumulator tank and include valve elements having an open position for

dispensing liquid into the containers and a closed position for preventing the
5 dispensing of liquid after the containers are filled.

15. The filling machine as in claim 14, wherein each said filling head
comprises a central control member, said control member supplied with any
combination of electrical and pneumatic lines for actuating and controlling said
filling elements of said respective filling head, said filling elements in
5 communication with said control member for generally simultaneous operation.

16. The filling machine as in claim 15, wherein said filling heads are
connected to said control member by a common header line.

17. The filling machine as in claim 15, wherein said filling heads are
individually connected to said control member.

18. The filling machine as in claim 1, wherein the groups of containers
are conveyed in contact against each other between said indexing arms, said
indexing arms having a width and circumferential spacing to ensure that
individual containers within said group are generally aligned with said filling
5 elements of a respective said filling head.

19. The filling machine as in claim 1, wherein said indexing arms
comprise a shaped tip having an angled surface at a following side of said arm in
a direction of rotation of said rotating platform such that upon extension of said
indexing arms from their retracted position, line pressure of the containers is
5 relieved to the following side of said arms.

20. The filling machine as in claim 1, wherein said conveyor and said
rotating platform comprise a continuous moving surface.

21. The filling machine as in claim 1, wherein said rotating platform is a generally circular platform separate from said conveyor.

22. The filling machine as in claim 1, wherein said indexing arms comprise an angled leading edge surface and are variably positionable in a radial direction such that circumferential spacing between the containers is varied by adjusting the radial position of said indexing arms.

23. The filling machine as in claim 22, further comprising in-feed guide elements disposed generally at said in-feed section so as to guide the containers from said conveyor onto said rotating platform in a single serial row, said indexing arms being of a number and spacing so as to be extendable between
5 each of the containers; and whereby containers of varying size are accommodated by adjusting the degree of radial extension of said indexing arms.

24. A continuous circular motion filling machine for filling containers conveyed thereto, said machine comprising:

a rotating platform having an in-feed section disposed to receive empty containers and an out-feed section disposed to transfer filled containers from
5 said rotating platform, said rotating platform rotatable relative to a vertical rotating axis;

a filling turret disposed generally above said rotating platform and rotatable at a speed corresponding generally to that of said rotating platform, said filling turret further comprising a plurality of circumferentially disposed filling
10 elements movable between a rest position and a filling position as said turret rotates between said in-feed and out-feed sections;

a plurality of radially extensible and retractable indexing arms circumferentially spaced around said rotating platform, said indexing arms retracted at said in-feed section and subsequently extended as said rotating platform rotates so as to index the containers into groups on said rotating platform between said indexing arms, each said group arranged in a desired pattern and spacing between adjacent said indexing arms corresponding to a pattern and spacing of said filling elements; and

15 wherein said filling elements are movable from said rest position to said filling position subsequent to indexing of the containers by said indexing arms for filling the containers.

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25. The filling machine as in claim 24, further comprising an in-feed conveyor disposed to deliver containers to said in-feed section and an out-feed conveyor disposed to transfer filled containers from said out-feed section.

26. The filling machine as in claim 25, wherein said in-feed and out-feed conveyors and said rotating platform comprise a continuous moving platform.

27. The filling machine as in claim 25, wherein said rotating platform is a separate component from said in-feed and out-feed conveyors.

28. The filling machine as in claim 24, wherein said indexing arms are circumferentially spaced such that each said group of the indexed containers contains at least one container.

29. The filling machine as in claim 24, wherein said indexing arms are circumferentially spaced such that each said group of the indexed containers contains a plurality of containers arranged in a single serial row.

30. The filling machine as in claim 24, wherein said indexing arms are circumferentially spaced such that each said group of the indexed containers contains a plurality of containers arranged in multiple parallel rows.

31. The filling machine as in claim 24, wherein said filling turret comprises a plurality of circumferentially disposed filling heads, said filling heads disposed generally above said rotating platform and rotatable at a speed corresponding to the rotational speed of said rotating platform, each said filling
5 head comprising a grouping of said filling elements arranged in a pattern corresponding to a pattern of the indexed container groups.

32. The filling machine as in claim 31, wherein each said filling head comprises an accumulator tank for supplying a filling liquid to said filling heads.

33. The filling machine as in claim 32, further comprising a central reservoir, said accumulator tanks in fluid communication with said reservoir for supplying said filling liquid to said accumulator tanks.

34. The filling machine as in claim 31, wherein said filling heads are vertically movable between said rest and filling positions as said filling heads rotate with said filling turret.

35. The filling machine as in claim 34, wherein said filling heads are movably supported on generally vertically oriented support arms disposed

circumferentially around said filling turret, said filling heads driven in a reciprocating vertical path on said support arms.

36. The filling machine as in claim 35, wherein said filling heads are conveyed along a cam track as said filling turret rotates, said cam track driving said filling heads in a reciprocating vertical path as said filling turret rotates.

37. A method for filling containers in an automated filling operation, comprising:

conveying a generally continuous stream of adjacent contacting containers to an in-feed section of a circular filling machine;

5 at the in-feed section, transferring the continuous stream of containers onto a generally circular rotating path;

after said transferring, indexing the continuous stream of containers on the circular rotating path into groups having a desired number of containers in each group;

10 after said indexing, engaging the containers with respective rotating filling elements; and

filling the containers with the filling elements as there are conveyed along an arcuate portion of the circular rotating path.

38. The method as in claim 37, comprising indexing the continuous stream of containers into groups of at least one container with indexing arms that are extendable and retractable relative to the circular rotating path.

39. The method as in claim 37, comprising conveying the containers to the in-feed section with an in-feed conveyor and subsequently transferring the containers to a rotating platform that defines the circular rotating path.

40. The method as in claim 37, comprising conveying the containers to the in-feed section and along the circular rotating path on a continuous conveyor.

41. The method as in claim 37, comprising moving the filling heads in a reciprocating vertical path between a rest position and a filling position as the filling heads rotate.

42. The method as in claim 37, comprising indexing the containers into groups of one container.

43. The method as in claim 42, comprising indexing the containers with a radially extendable indexing arm and controlling the circumferential spacing between adjacent containers by varying the degree of radial extension of the indexing arms.

44. The method as in claim 37, comprising indexing the containers into groups of a plurality of containers.

45. The method as in claim 44, wherein the plurality of containers within each group are maintained in contact with each other.

46. The method as in claim 44, comprising indexing the plurality of containers into a single serial row within each group.

47. The method as in claim 44, comprising indexing the plurality of containers into multiple parallel rows within each group.

48. The method as in claim 37, comprising conveying the filled containers from the circular rotating path at an out-feed section to an out-feed conveyor.

49. A continuous circular motion filling machine for filling containers conveyed thereto, said machine comprising:

a rotating platform having an in-feed section disposed to receive empty containers and an out-feed section disposed to transfer filled containers from
5 said rotating platform, said rotating platform rotatable relative to a vertical rotating axis;

a filling turret disposed generally above said rotating platform and rotatable at a speed corresponding generally to that of said rotating platform, said filling turret further comprising a plurality of circumferentially disposed filling
10 elements movable between a rest position and a filling position as said turret rotates between said in-feed and out-feed sections;

an in-feed guide element disposed generally at said in-feed section so as to guide the containers from said conveyor onto said rotating platform in a desired pattern, said in-feed guide elements extending around at least a portion
15 of the circumference of said rotating platform; and

said filling elements movable from said rest position to said filling position before the containers are moved beyond said in-feed guide elements.

50. The filling machine as in claim 49, further comprising a plurality of radially extensible and retractable indexing arms circumferentially spaced around
20 said rotating platform, said indexing arms retracted at said in-feed section and

subsequently extended as said rotating platform rotates so as to index the containers into groups of at least one container on said rotating platform between said indexing arms, each said group arranged in a desired pattern and spacing between adjacent said indexing arms corresponding to a pattern and spacing of
5 said filling elements.

51. A method for filling containers in an automated filling operation, comprising:

- conveying a generally continuous stream of adjacent contacting
containers to an in-feed section of a circular filling machine;
- 10 at the in-feed section, transferring the continuous stream of adjacent contacting containers onto a generally circular rotating path and conveying the articles around the rotating path in adjacent contact with each other;
- after said transferring, engaging the containers with respective rotating filling elements; and
- 15 filling the containers with the filling elements as there are conveyed along an arcuate portion of the circular rotating path.

52. The method as in claim 51, further comprising after said transferring, indexing the continuous stream of containers on the circular rotating path into groups having a desired number of containers in each group such that a
20 circumferential space is defined between the containers of different groups.